

AMI...ALIGNMENT SYSTEM

Operations Manual

**A precision floppy drive head alignment and
performance monitoring system
For the
Commodore Amiga Personal Computer**

<BSD> SoftWare

Free Spirit Software

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CHAPTER 1

NOTICES

1.1 Copyrights

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1.4 Disclaimer

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CHAPTER 2

INTRODUCTION

2.1 Product Overview

Welcome to AMI...ALIGNMENT SYSTEM!

AMI...ALIGNMENT SYSTEM is a precision floppy drive performance and head alignment system that will evaluate every facet of your Amiga's floppy drives. AMI...ALIGNMENT gives clear, concise advice to correct any deficiencies found with on-screen help as the program runs and extensive documentation. With AMI...ALIGNMENT SYSTEM you can cure your Amiga of the 'flaky floppy' syndrome that results in the dreaded 'DISK CORRUPT' requester and spurious read-write errors on otherwise perfectly good diskettes. With this program you can gain confidence in what has up to now been the weakest link in an otherwise amazing personal computer.

AMI...ALIGNMENT SYSTEM uses an intuitive control panel interface that literally puts you in complete control of your disk drives. Complete with control buttons, indicator lights, digitized stereo sound effects, and a cathode ray tube (CRT) display, the spaceship style Control Panel also supports a complete set of keyboard short cuts for your convenience. An oversize CRT screen full of help text tailored to the test you're conducting is always available by pressing the <HELP> key. For a permanent record of the tests performed, AMI...ALIGNMENT will generate printed output based on your Preferences settings.

DO YOU HAVE A PROBLEM WITH YOUR FLOPPY DRIVES?

If you have ever gotten a 'DISK CORRUPT' system requester from what used to be a perfectly good diskette, or a diskette formatted with one drive cannot be read by another drive, or your drives seem to take too long reading or writing files, then chances are you are experiencing the 'flaky floppy' syndrome so common to the Amiga.

Four functions make up the heart of AMI...ALIGNMENT SYSTEM. Each function tests a different facet of the drives performance, and includes full error reporting (in plain english!) and a HELP screen that tells you how to evaluate the test results, and what if any corrective action is required.

The tests are:

1. Automatic Alignment Function - Automatically controls the disk drive while testing various track alignments. You need only watch the CRT display and make adjustments if required.
2. Drive Motor Speed Function - Tests the drive main motor speed. Valuable in determining various aspects of the hardware, AND MOST VALUABLE in testing for a binding or defective diskette.

CHAPTER 2. INTRODUCTION

3. Drive Performance Function - includes 3 separate tests:
 1. Track integrity test - Creates a track, then tests its location and integrity. Valuable for testing quality of diskette media and read-write head electronics.
 2. Write Test - Writes a track of data and measures the data transfer speed to the diskette in Bytes per Second.
 3. Read Test - Reads a track of data and measures the data transfer speed from the diskette in Bytes per Second.

The READ WRITE tests also evaluate the integrity of the ROM system software that controls the disk drive hardware.

4. Manual Mode Drive Alignment - This test gives you absolute control of the drive, including starting and stopping the motor, moving the heads by single track increments, and selecting when and on what track to test alignment. Also valuable for cleaning the read-write heads (using a cleaning disk, not provided).

2.2 The Operations Manual

This manual is provided as a reference guide to AMI...ALIGNMENT SYSTEM and included utilities. The manual includes a full description of all of the tests mentioned in section 2.1, and diagnostic charts to assist you in determining the corrective action for any unsatisfactory condition or error. Also included are disassembly and adjustment diagrams for a wide range of drives.

2.3 System Requirements

This program requires an Amiga 500, 1000 or 2000 with at least 512 Kilobytes of memory and one floppy drive. A stereo monitor, printer and external floppy drives are supported but not required.

2.4 Hard Disk Drive Installation

For your convenience, a hard disk drive installation program is included on the program disk. To install AMI...ALIGNMENT SYSTEM onto your hard disk, follow the following steps:

1. Before running the HD_INSTALL program, ensure that your system directory assignments are ASSIGNED to the hard drive or equivalent device. HD_INSTALL will not work correctly if you have booted your system from the AMI...ALIGNMENT SYSTEM program disk.
2. Double click on the HD_INSTALL icon. A large requester will prompt you for the name of the target directory where you want to install AMI...ALIGNMENT. Enter the FULL path name of the target directory, such as 'DH2:Utilities', and click on the INSTALL gadget.
That is all there is to it!
3. HD_INSTALL will copy the necessary files to the target directory of your choice. Additionally, three fonts will be added to your FONTS: directory.

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2.5 Archival Backup of the Program Disk

Before you begin using AMI...ALIGNMENT SYSTEM, make a backup copy of the program disk. Information on how to do this is contained in the manuals provided with your Amiga.

DON'T attempt to back up the Calibration disk. For the Calibration disk to be effective, it must be precision copied on a professional duplicating machine. Although AMI...ALIGNMENT SYSTEM will happily believe the copy of the calibration disk is valid, you cannot trust the Alignment Test results with anything but the original disk. The floppy drive you copy the calibration disk with may be slightly misaligned, resulting in a misaligned calibration disk and subsequent unreliable test results!

Chapter 3

GETTING STARTED

3.1 Booting from The AMI...ALIGNMENT Program Disk

The AMI...ALIGNMENT SYSTEM program disk is a bootable disk. To boot with it, simply insert the program disk in your Amiga's internal drive and reset (press <CTRL> <COMMODORE> <AMIGA> keys) or turn on the computer. For Amiga 1000 owners, insert the program disk at the 'Insert Workbench Disk' screen prompt. A normal Workbench startup will occur, except after the Workbench screen appears the drive will continue to run. After a few moments the introductory screen will appear, then the control panel.

3.2 Starting AMI...ALIGNMENT From The Workbench

To start AMI...ALIGNMENT from the Workbench, double click on the AMI...ALIGNMENT disk icon, then double click on the large icon called ALIGN. In order for the program to load normally, the 3 fonts required for AMI...ALIGNMENT must be in your FONTS: directory!. If the required fonts are not in your current FONTS: directory, a large system requester will appear on the Workbench screen giving you the option to use the built in system ROM fonts or run the 'ASSIGN=>FONTS' program, (provided) which makes the special fonts available to AMI...ALIGNMENT. Using the ROM fonts, AMI...ALIGNMENT will work satisfactorily, but significant test results and messages will not display in large letters. Additionally, AMI...ALIGNMENT 'looks ahead' during loading to ensure there is enough memory available. If there is not, it will display a system requester advising you to free up memory.

CHAPTER 3. GETTING STARTED

3.3 Starting AMI...ALIGNMENT From The CLI

To Start AMI...ALIGNMENT from the CLI, you MUST issue the change directory command (CD) to the directory that contains AMI...ALIGNMENT and all of its support files. You CANNOT run the program by simply specifying the full path name in the run command. (i.e. RUN DH2:Utilities/ALIGN) Assuming that the program is in the DH2:Utilities directory, you would type the following from the CLI:

```
CD DH2:Utilities <RETURN>
ALIGN <RETURN> (or RUN ALIGN <RETURN> for multi-tasking)
```

The fonts and memory requirements mentioned in section 3.2 also apply.

3.4 The Calibration Disk

As stated earlier, the original calibration disk is critical to the accurate evaluation of the disk drive. A locally copied calibration disk will more than likely be slightly misaligned. Although this slight misalignment would not affect the drives ability to read or write files to the disk under normal circumstances, it WILL affect the accuracy of the alignment and speed tests. Don't trust the results from any disk but the original calibration disk.

AMI...ALIGNMENT will check for the presence of the calibration disk prior to the tests that require it, but it will continue the test even if it cannot verify the Cal disks presence in the test drive. This is to allow the testing and alignment of a drive that is initially so far out of alignment that it cannot read any disk.

Chapter 4

THE CONTROL PANEL

4.1 Introduction To The Control Panel

AMI...ALIGNMENT SYSTEMS uses a space ship style machinery control panel to communicate with the disk drives and the user. The main panel consists of various sub-panels grouped together by function. Each panel consists of various buttons, indicator lights and data displays. For best results, AMI...ALIGNMENT should be running on your Amiga as you read about each sub-panel below.

4.2 Global Controls Sub Panel

The QUIT Button:

Pressing the QUIT Button will cause AMI...ALIGNMENT to stop running. Note: The QUIT button will not terminate the program if a test is in

CHAPTER 4. THE CONTROL PANEL

progress. The CRT Error Line will display a 'Function in Progress' error.

The PRINT Button:

Pressing the PRINT button toggles the printing feature on and off. The CRT Display includes the PRT: indicator light. If this light is on (red), the printer feature is on, and any tests conducted will generate a hard copy report, as well as the standard test results to the CRT. NOTE: Printing cannot be turned ON or OFF during a test. The CRT Error Line will display a 'Function In Progress' error if this is attempted. See Section 13 for more information on printing.

The SOUND Button

Pressing the SOUND Button toggles the digitized sound effects ON or OFF. As with the print feature, the SND: indicator light below the CRT will be on (RED) if the sound feature is turned on. The SOUND feature can be toggled ON or OFF at any time. Sound effects are only used for the Auto Alignment and Manual Alignment tests.

The W/B Button

The W/B (WorkBench) Button pops the Workbench screen to the front and pushes the AMI...ALIGNMENT screen to the back. This button is similar in function to the standard screen depth arranging gadget on an Intuition screen. As with the SOUND Button, the W/B Button is available for use at any time, even during a test.

4.3 The CRT Display Sub Panel

The upper right hand sub panel is a Cathode Ray Tube display screen that provides text displays from AMI...ALIGNMENT. The CRT Display is the 'Computer Monitor' for the machinery control panel. The CRT Display consists of 3 lines of text. Each line is defined below, and Section 10 gives a complete list of all possible messages. Additionally, the print (PRT:) and sound (SND:) features have their indicator lights on this sub-panel.

The Status Line:

The top one third of the display gives the current program status, in an 8 point font. This is essentially a textual echo of whatever control panel buttons were pressed. Additionally, the status line is used to display less significant test results, such as Average Drive Motor Speed etc.

The Message Line:

The center one third of the display line is where AMI...ALIGNMENT displays its important messages in a 16 point (large) font. The Message line will display major test results and important 'next step' instruction. An example would be 'SELECT DRIVE', indicating that the user must select a drive before anything else can occur. (Note: The Global Controls mentioned above are independent of these types of prompts.) This is also where the most significant part of a test result is displayed. Using the example of Drive Motor Speed, the Message Line

CHAPTER 4. THE CONTROL PANEL

displays the real time drive motor speed in a large font, while the less significant status line displays the average drive motor speed in a small font.

The Error Line:

The bottom one third of the display is the Error Line. AMI...ALIGNMENT displays both drive errors and system errors here. Drive or system errors are displayed in red text. Also, some tests will generate a prognosis on this line. If the prognosis is good, the text will be printed in green, otherwise all error line messages are printed in red.

4.4 The Drive Select Sub Panel

The Drive Select Panel consists of four drive ON buttons with associated drive indicator lights, and a drive OFF button and light. To select a drive to test, press the appropriate button. If the drive was allocated for use successfully, the drive indicator light will come on (RED) and the CRT Display will display the appropriate text. If for some reason the drive could not be allocated (such as the selected drive was not connected) the CRT Display will show an appropriate error message.

A selected drives Workbench Icon will display a BUSY symbol, and that drive will not be available to any other task.

If a drive is selected for a test, but no test has been started, another drive can be allocated for use by pressing its button. This will automatically de-select the first drive. (The indicator lights will turn on and off during this process.) A drive cannot be un-selected (by pressing the OFF button) while a test is in progress.

The selected drive need not be turned off before exiting the program. This is done automatically by AMI...ALIGNMENT.

NOTE: When a drive is deselected, either by pressing the Drive Select OFF button, by selecting another drive, or by exiting the program, the drive is 'given back' to the WorkBench, and if a disk is in the drive, the drive will grind for a few seconds as Workbench reads the disks Icon file.

4.5 The Function Select Sub Panel.

The Function Select Panel consists of four function ON buttons with associated function indicator lights, and a function OFF button and light. The buttons are:

ALIGN - The Automatic Alignment Function

SPEED - Drive Motor Speed Function

PERF. - The Performance Function

MAN. - The Manual Drive Control Function

See Sections 5 thru 8 for a detailed description of each function.

CHAPTER 4 THE CONTROL PANEL

To select a function to test, press the appropriate button. If the function was successfully selected, the Function indicator light will come on (RED) and the CRT Display will display the appropriate text.

If for some reason the Function could not be selected (such as no drive had been selected first) the CRT Display will show an appropriate error message. Once a function has been selected, that function must be turned off before any other function can be turned on.

4.6 The Manual Drive Control Sub Panel

The Manual Drive Control sub panel consists of the selected drives data display, and the appropriate controls for direct control of a disk drive. The manual controls are not activated unless the MANUAL function has been selected.

The data display includes the following:

DRIVE CONTROL - Displays AUTOMATIC or MANUAL. All of the 4 functions on the Function Select Panel will perform AUTOMATIC drive control with the exception of the MANUAL function.

ACTUAL TRACK - Shows the disk track that the drives read write head are physically located at. If this display shows a '*' (double asterisk) symbol during a track alignment test, it indicates that the desired track could not be read. This value should be between 00 and 79.

TARGET TRACK - Shows the disk track that AMI...ALIGNMENT has sent the read write heads to (in Automatic Control Mode), or the track that the user has selected in Manual Control Mode. This value will be between 00 and 79.

TIME - This shows the amount of time taken to perform a particular track test expressed as a percentage. The standard time value used is the average amount of time it takes to move 80 tracks (cylinders) and read 10000 Bytes (approximately one cylinder) of data. This is a more meaningful and easier to understand value than microseconds.

MOTOR ON LIGHT - This indicator light will come on (RED) any time that AMI...ALIGNMENT tells the selected disk drives motor to turn on, either in MANUAL or AUTOMATIC mode.

NOTE: The CBM floppy drive indicator light is wired to come on any time the drive motor is running, so that the AMI...ALIGNMENT drive motor light and the disk drives own light are exactly synchronized. However, this is not true of some third party floppy drives whose drive light is wired to come on any time there is a data transfer and therefor not related to the drive motor.

CHAPTER 4. THE CONTROL PANEL

HEADS IN MOVEMENT LIGHT - This light will come on any time the disk drive heads are in movement in either MANUAL or AUTOMATIC Control mode. Normally, this light flashes on only briefly. A good indication of an error occurring is when the light comes on and stays on for a few seconds.

The Drive Manual Controls include the following:

NOTE: These controls are not active unless the MANUAL function has been selected.

MOTOR ON and OFF Buttons - These buttons give you direct control of the drive motor. When the MANUAL function is initially selected, the drive motor is OFF.

HEAD UP and DOWN Arrows - Pressing these arrows cause the drives read write heads to move to the indicated Target track. If the move was successful, the Actual track display will indicate the same value as the Target track.

TEST - This button, when pressed, initiates a Track Alignment test of the target track displayed. This is the same test that the AUTO ALIGNMENT Function performs automatically.

NOTE: Another useful purpose of the Manual Controls is for the cleaning of the drives read write heads. To do this, select a drive, then select MANUAL from the Function Select panel. Insert the Cleaning disk into the drive and press the MOTOR ON Button. Leave the motor running for as long as the documentation provided with your cleaning disk specifies. When complete, simply turn off the drive motor.

Chapter 5

The Automatic Alignment Function

5.1 What the Auto Alignment Test Does

The Auto Alignment Function scans the disk surface and evaluates the track location in three places, the center of the disk and the outer and inner tracks. As each track is evaluated a track alignment report is generated on the CRT Display. After each disk scan is complete, an overall alignment report is displayed, along with a prognosis.

The Auto Alignment Function is a quick and easy way to test the alignment integrity of a disk drive. There is no operator action required after the test has begun until it is terminated by the user.

The Alignment Function is a looping test, that is, the disk scan and reports will continue until the FUNCTIONS OFF button or its keyboard

CHAPTER 5. AUTO ALIGNMENT FUNCTION

equivalent is pressed

NOTE: This is the first test that should be run. The results of both the SPEED and PERFORMANCE test rely on a correctly aligned drive.

5.2 Performing A Drive Alignment Test

The following steps will demonstrate how to perform a Auto Alignment Test on a floppy drive. For this example, drive DF0: will be evaluated.

- With AMI...ALIGNMENT running, no drives selected, Printer OFF and Sound ON (the default settings).
- Select drive DF0: by pressing the DF0: button in the Select Drives panel.
- Insert the original calibration disk into drive DF0:.
- Select the ALIGN Function from the Select Function panel.

NOTE: The Auto Alignment Function MUST have a disk inserted into the test drive. It will attempt to verify the calibration disk, but if it cannot, (because the drive may be so far out of alignment) it will allow the test to continue so long as a disk is in the drive.

- Notice that the Drive Motor Light comes on, the Actual Track, Target Track and Time displays begin to show values, and the Heads light flashes on and off. Here is what's happening...
 - Track 00 is located, then evaluated. This causes the Target Track to show '00'. If the track alignment evaluates as SATISFACTORY, then Actual track will show '00' as well, and the Message Line (the center one third of the CRT Display) will show SATISFACTORY. The Time Value should be at or below 100%. While this is occurring, the CRT Status line will show 'Testing Track Alignment'. During the actual evaluation process, the Message Line will display a '...' prompt, to notify you that a test is occurring. When the evaluation process is over for that track, the Message Line will show either UNSATISFACTORY or SATISFACTORY. An Unsat condition is difficult to ignore as the letters are now printed in bright red on the CRT Display and the Actual Track value has become a double asterisk (**).
 - The important items to observe are the Message Line of the CRT Display and the time value.
 - The above procedures are repeated for track 39 and track 79.
- After all three tracks have been evaluated, an alignment

CHAPTER 5. AUTO ALIGNMENT FUNCTION

report is displayed. Additionally, A prognosis is displayed in the Error Line of the CRT Display. If all of the tracks tested SATISFACTORY, the prognosis will be 'No Alignment Needed'. If one or more tracks tested as UNSATISFACTORY, an alignment condition of POOR or UNSATISFACTORY will result. The prognosis will be 'Needs Alignment'.

- One other item needs to be considered when evaluating a drives alignment condition. The time value should be the same or very nearly the same for each track tested, and all values should be at or below 100%. If all tracks test satisfactory, and one or more tracks have a time value greater than 100%, the drive is very slightly out of alignment.
- The Auto Alignment test is a looping test. It should be allowed to loop a few times before a decision is made to disassemble the drive and adjust the alignment.

5.3 Making Adjustments To The Stepper Motor

All floppy drives covered in this manual have a small electric motor that positions the read write heads over the surface of the diskette, seeking tracks and reading or writing data. Alignment problems begin when the circuitry that controls the heads believe a track is in a certain location, but the heads can't find, or have a difficult time finding, the track. This 'heads in one place, track in another' problem causes corrupt disk requesters, spurious errors, and disks formatted by one drive that can't be read by another. In short, alignment problems. The actual cause of alignment problems are numerous, but the important point is that adjustments are provided on all drives that, in conjunction with AMI...ALIGNMENT, allow the user to restore the drive to a better than new condition.

The secret to aligning a drive is adjusting the stepper motor. By twisting the stepper motor, the relationship of the drive heads to the diskette track is changed. With AMI...ALIGNMENT giving continuous feedback via screen displays and sound effects, it is a simple procedure to gently twist the stepper motor until all of AMI...ALIGNMENTS displays indicate that the alignment condition is SATISFACTORY and the test time values are the same (or nearly the same).

The following is a step by step procedure to realign a drive with AMI...ALIGNMENT:

- Prepare your drive for adjustment with the applicable portions of Section 9. Be sure to read the warnings in Section 9.1!
- With the opened drive connected and AMI...ALIGNMENT running, select the test drive, insert the calibration disk, then select the ALIGN function.
- Twist the stepper motor a very small amount while watching the

CHAPTER 5. AUTO ALIGNMENT FUNCTION

Message Line and the Time value. Allow the test to complete a full disk scan between adjustments.

If the stepper motor moves its full travel and the CRT Display still indicates UNSATISFACTORY, gently twist the stepper motor in the opposite direction until the CRT Display indicates SATISFACTORY Alignment Condition and all time values are nearly equal.

NOTE: For worm gear driven heads, the size of an individual adjustment can be relatively large (1/4 inch of twist). For direct gear driven heads, Very small adjustments are required to achieve alignment.

HELPFUL HINTS:

- Have patience. Perfect results may take a few tries.
- Be sure the factory installed sealer around the stepper motor mount screws is completely removed before attempting adjustment. This sealer can cause the stepper motor to bind on its mount, prematurely limiting range of movement.
- For direct gear driven stepper motors, the small movement required to achieve alignment may be easier to obtain by using a small screwdriver to pry against the stepper motor mount tabs.

5.4 The Sound Effects

Sound effects are provided as part of the Auto Alignment and Manual Alignment Test. By responding to the sound effects, adjustments can be made to the stepper motor without watching the screen display. This feature is provided for awkwardly placed drives or monitors.

As the Auto Alignment test is a looping test, constant repetitions of the sound effects can become annoying. The SOUND button on the Global Control panel is provided to turn off the sound effects.

During Alignment testing, either Manual or Automatic, any time a track or disk alignment condition of SATISFACTORY is displayed, a high pitched ping sound is played. For UNSATISFACTORY conditions, a much lower pong sound is played.

5.5 Printer Output

When the printer feature is turned ON, a real time printed report is generated in conjunction with the CRT Display report. The report consists of the following:

- A Report header, including date, time, drive number and test.

CHAPTER 5. AUTO ALIGNMENT FUNCTION

- Target Track, Actual Track and Time value
- Alignment condition for the tested track
- Alignment condition for the 3 track scan, including prognosis.

As the printer prints in real time, a slow printer will slow down the generation of test results, but will have no effect on the quality of the tests themselves.

Chapter 6

The Drive Motor Speed Function

6.1 What the Drive Motor Speed Test Does

The Drive Motor Speed Function Uses the index sync mark on the disk surface to determine how fast (in RPM's) the disk is rotating under the read write heads. This information is useful in determining the following:

- The condition of the drive motor.
- The condition of the drives power supply.
- The general mechanical condition of the drive.
- The condition of the test diskette.

The Drive Motor Speed Function will display an average RPM in the Status Line and a real time RPM in large numbers in the Message Line of the CRT Display.

6.2 Interpreting Test Results

Normal drive motor RPM for the Amiga 3.5" floppy drive is 300 RPM.

The below information is based on a correctly aligned drive! The Auto or Manual Alignment tests should be completed first. See also Section 12.1 for other considerations.

- Consistently LOW drive speed:
Warped drive frame, worn drive motor or weak power supply.
- Fluctuating LOW drive speed.
Floppy diskette probably binding in the sleeve.

CHAPTER 6. DRIVE MOTOR SPEED FUNCTION

- Fluctuating or consistently HIGH drive speed:
Incorrect Processor mode on computer boot up (machine operating in Motorola 68020 mode vice 68000 mode.)

6.3 Printer Output

When the printer feature is turned ON, a real time printed report is generated in conjunction with the CRT Display report. The report consists of the following:

- A Report header, including date, time, drive number and test.
- Ideal Speed (always 300 RPM).
- Real time speed and the average speed.

As the printer prints in real time, a slow printer will slow down the generation of test results, but will have no effect on the quality of the tests themselves.

Chapter 7

The Drive Performance Function

7.1 Performance Function Overview

The Drive Performance Function consists of three separate tests, which between them completely evaluate the performance of the test drive and the disk operating system software. The Drive Performance Function is significantly different that the other three functions of AMI...ALIGNMENT in the following ways:

- This is a **DESTRUCTIVE FUNCTION!**

The 3 tests will destroy any data or formatting on the diskette!

- A Request to Cancel is provided.
After pressing the PERF button to select the Performance Function, a large AMI...ALIGNMENT requester gives the option of canceling the function.
- The function is non-looping.
The function will perform its three tests, then terminate.

The three tests are outlined below.

7.2 Track Integrity Test

This is the first of three tests that make up the Performance Function.

CHAPTER 7. DRIVE PERFORMANCE FUNCTION

7.2.1 What the Test Does.

This test creates a track on the disk surface, then checks the track for location and integrity. The test begins at track 0 side 0 and creates all of the normal Amiga floppy tracks. NOTE: These are NOT AmigaDOS tracks.

7.2.2 Interpreting Test Results

This test displays a 'VALID TRACK' message to the CRT Display if the track created passes the above criteria. If a track fails the above criteria, an error will display in the Error Line of the CRT, and the Message line will show 'BAD TRACK' for the indicated track. BAD TRACK messages usually indicate disk media problems.

7.2.3 Printer Output

Printed output for this test of the Performance Function consists of the following:

- Which of the three Performance Tests is in progress.
- Target and Actual Track currently being tested.
- Time value for indicated track.
- Test Results for indicated track. If an error occurs, the error will be printed instead of the test results.

7.3 Write Test

7.3.1 What The Test Does

This test measures the byte per second rate of write operations to the test diskette. This test evaluates the drive electronics and disk media. The AmigaDOS ADDBUFFERS command will have no effect on the test results.

7.3.2 Interpreting Test Results

Normal values for write operations are approximately 5000 bytes/sec. Values lower than this can indicate dirty read write heads, defective diskette media, or a mechanical fault with the drive.

7.3.3 Printer Output

Printed output for this test of the Performance Function consists of the following:

- The Performance Tests in progress.

CHAPTER 7. DRIVE PERFORMANCE FUNCTION

- Target and Actual Track currently being tested.
- Time value for indicated track.
- Test Results for indicated track. If an error occurs, the error will be printed instead of the test results.

7.4 Read Test

7.4.1 What The Test Does

This test measures the byte per second rate of read operations from the test diskette. The AmigaDOS ADDBUFFERS command will have no effect on the test results.

7.4.2 Interpreting Test Results

Normal values for read operations are approximately 12000 bytes/sec. Values lower than this can indicate dirty read write heads, defective diskette media, or a mechanical fault with the drive.

7.4.3 Printer Output

Printed output for this test of the Performance Function consists of the following:

- The Performance Tests in progress.
- Target and Actual Track currently being tested.
- Time value for indicated track.
- Test Results for indicated track. If an error occurs, the error will be printed instead of the test results.

Chapter 8

Manual Mode Drive Control

8.1 Manual Drive Alignment

8.1.1 What the Test Does

The Manual Drive Alignment Test allows the user complete control of the drive motor, head position and tested track. The Manual Drive Alignment performs the identical test as the Automatic Drive Alignment Function. For details on the alignment test itself, see section 5.1 and 5.2 of this manual. Manual Drive Alignment is most useful for badly misaligned drives, or where movement of the read write heads during the test procedure makes adjustment of the stepper motor difficult.

8.1.2 Performing the Manual Alignment Test

The Manual Test is performed similar to the Auto Alignment Test discussed in Section 5. Instead of selecting the ALIGN function button, select MANUAL. This activates the manual drive controls located in the Manual Drive Control Sub Panel (see Section 4.6). NOTE: As with the Auto Alignment test, the original Calibration disk should be inserted into the test drive prior to selecting the MANUAL button.

With a test drive selected and the Calibration disk in the drive:

- Press the MOTOR ON Button.
- Position the heads to the track of your choice. (For badly misaligned drives track 39 is a good place to start.)
- Press the TEST button or its keyboard equivalent.

The CRT will display the same track evaluation message as described in Section 5.2. Evaluation of drive condition is done in the same manner as Section 5.2.

8.1.3 Printer Output

When the printer feature is turned ON, a real time printed report is generated in conjunction with the CRT Display report each time the TEST button or its keyboard equivalent is pressed. The report consists of the following:

- A Report header, including date, time, drive number and test.
- Target Track, Actual Track and Time value
- Alignment condition for the tested track

CHAPTER 8. MANUAL MODE DRIVE CONTROL

8.2 Other Uses for Manual Mode

The most significant use for manual mode drive control other than the Manual Alignment Test is cleaning of the drives read write heads. To do this, select a drive, then select MANUAL from the Function Select panel. Insert the Cleaning disk (purchased separately) into the drive and press the MOTOR ON Button. Leave the motor running for as long as the documentation provided with your cleaning disk specifies. When complete, simply turn off the drive motor and press the FUNCTION OFF button.

Chapter 9

Drive Disassembly

9.1 Warnings!

!-- ELECTRICAL SAFETY WARNING --!

Performing a drive realignment with AMI...ALIGNMENT SYSTEM requires that the user work around exposed and energized electrical and electronic components. THIS REPRESENTS AN ELECTRICAL SAFETY HAZARD! Extreme care should be exercised! The publishers bear no responsibility for any harm to persons or equipment that results from following procedures in this manual or from the HELP screens in AMI...ALIGNMENT SYSTEM.

!-- INVALIDATED WARRANTY WARNING --!

Following the disassembly and realignment instructions in this manual will invalidate most factory warranties if still in effect!

9.2 Conventions

Listed below are various floppy drives for the Amiga Computer. Numerous versions of each drive exist. Disassembly instructions are therefor as generic as possible for each drive discussed. Significant differences between drives of the same make are commented upon in the accompanying text. NOTE: The differences discussed MAY NOT ADDRESS EVERY DRIVE OF SIMILAR MAKE AVAILABLE.

As adjustments to the stepper are the key in drive realignment, each drives stepper motor configuration will be discussed in detail. To date, two types of stepper motors have been observed in Amiga floppy drives.

- Direct Gear drive stepper motor. All drives supplied from Commodore-Amiga (A-1000, A2000 and A-500 internal, and the

CHAPTER 9. DRIVE DISASSEMBLY

A1010 external). See figure 14.4.1

- Worm Gear drive stepper motor. All third party manufactured drives discussed in this manual. See figure 14.5.1 and 14.5.2.

9.3 A2000 Internal Drive(s)

DISASSEMBLY:

ENSURE THE COMPUTER AND ALL PERIPHERALS ARE TURNED OFF AND UNPLUGGED!

- Unplug the keyboard and mouse from their sockets on the front panel of the computer.
- Set the monitor to one side of the computer. It will be necessary to have the monitor on-line during the alignment process from this location.
- Remove the 4 side panel screws from the metal computer case, two from each side. (Refer to figure 14.1.1)
- Remove the center, upper screw from the BACK panel of the computer.
- Gently slide the metal cover to the front, off of the chassis. Place the cover out of the way for the duration of the test.
- Remove the thin metal shroud from the test drive. The metal shroud may be attached with either spring clips or very small screws. If the shroud is attached with screws, it may be necessary to remove the drive from its mount plate to gain access to the shroud screws. Place the shroud out of the way for the duration of the test. (Figure 14.1.2)
- A2000 internal drives use the direct gear drive stepper motor. The stepper motor will be mounted on the left rear corner of the drive as seen from above. (Figure 14.1.2 and 14.4.1)
- Remove any sealer from around the stepper motor mount screws.
- Plug in the Keyboard, mouse and computer and boot AMI...ALIGNMENT SYSTEM. Prior to making any adjustments, carefully loosen the two stepper motor mount screws. (Fig. 14.4.1)
- After adjustments are complete, tighten the stepper motor mount screws and RETEST ALIGNMENT!
- Reassemble in the reverse order of disassembly.

CHAPTER 9. DRIVE DISASSEMBLY

9.4 A500 Internal Drive(s)

DISASSEMBLY:

ENSURE THE COMPUTER AND ALL PERIPHERALS ARE TURNED OFF AND UNPLUGGED!

- Unplug the keyboard and mouse from the computer
- Set the monitor to one side of the computer. It will be necessary to have the monitor on-line during the alignment process from this location.
- Remove the 6 screws from the bottom of the computer case. (Refer to figure 14.2.1)
- Gently remove the upper half of the computer housing off of the chassis. Place the cover out of the way for the duration of the test.
- Remove the thin metal shroud from the test drive. The metal shroud may be attached with either spring clips or very small screws. If the shroud is attached with screws, it may be necessary to remove the drive from its mount plate to gain access to the shroud screws. Place the shroud out of the way for the duration of the test. (Figure 14.1.2)
- A500 internal drives use the direct gear drive stepper motor. The stepper motor will be mounted on the left rear corner of the drive as seen from above. (Figure 14.1.2 and 14.4.1)
- Remove any sealer from around the stepper motor mount screws.
- Plug in the Keyboard, mouse and computer and boot AMI...ALIGNMENT SYSTEM. Prior to making any adjustments, carefully loosen the two stepper motor mount screws. (Fig. 14.4.1)
- After adjustments are complete, tighten the stepper motor mount screws and RETEST ALIGNMENT!
- Reassemble in the reverse order of disassembly.

9.5 A1010 External Drive

DISASSEMBLY:

ENSURE THE COMPUTER AND ALL PERIPHERALS ARE TURNED OFF AND UNPLUGGED!

Refer to figure 14.3.1.

- Remove the screws from the base of the drive.
- Lift the top half of the case off of the base. The metal shroud

CHAPTER 9. DRIVE DISASSEMBLY

that covers the drive assembly may be held on with screws or spring clips. Remove the shroud.

- The A1010 has a direct gear drive stepper motor. Refer to figure 14.4.1.
- Remove any sealer from around the stepper motor mount screws.
- Plug in the computer and boot AMI...ALIGNMENT SYSTEM. Prior to making any adjustments, carefully loosen the two stepper motor mount screws. (Fig. 14.4.1)
- After adjustments are complete, tighten the stepper motor mount screws and RETEST ALIGNMENT!
- Reassemble in the reverse order of disassembly.

9.6 The M.A.S.T. Drive

DISASSEMBLY:

ENSURE THE COMPUTER AND ALL PERIPHERALS ARE TURNED OFF AND UNPLUGGED!

Refer to figure 14.3.1.

- Remove the screws from the base of the drive.
- Slide the outer case off of the base of the unit. The metal shroud that covers the drive assembly may be held on with screws or spring clips. Remove the shroud.
- The M.A.S.T. has a worm gear drive stepper motor. Refer to figure 14.5.1. and 14.5.2.
- Plug in the computer and boot AMI...ALIGNMENT SYSTEM. Prior to making any adjustments, carefully loosen the two stepper motor mount ring screws. (Fig. 14.5.1 and 14.5.2.)
- After adjustments are complete, tighten the stepper motor mount ring screws and RETEST ALIGNMENT!
- Reassemble in the reverse order of disassembly.

CHAPTER 9. DRIVE DISASSEMBLY

9.7 The AIR Drive

DISASSEMBLY:

ENSURE THE COMPUTER AND ALL PERIPHERALS ARE TURNED OFF AND UNPLUGGED!

Refer to figure 14.3.1.

- Remove the screws from the base of the drive.
- Remove the outer case off of the base of the unit. The metal shroud that covers the drive assembly may be held on with screws or spring clips. Remove the shroud.
- The AIR Drive has a worm gear drive stepper motor. Refer to figure 14.5.1. and 14.5.2.
- Plug in the computer and boot AMI...ALIGNMENT SYSTEM. Prior to making any adjustments, carefully loosen the two stepper motor mount ring screws. (Fig. 14.5.1 and 14.5.2.)
- After adjustments are complete, tighten the stepper motor mount screws and RETEST ALIGNMENT!
- Reassemble in the reverse order of disassembly.

Chapter 10

CRT Display Messages

10.1 Status Line Messages

The following is a list of all CRT Display Status Line Messages. The Status Line is the upper one third of the CRT Display.

- Auto Alignment Check:

Displayed when Auto Alignment Function begins. This means that the test preconditions have been met. (i.e. a drive selected and a disk in the drive.)

- All Functions OFF:

This message shows whenever the FUNCTIONS OFF button (or keyboard equivalent) is pressed, or when a function fails selection.

- Auto Alignment Report:

This message displays in conjunction with the auto alignment test

CHAPTER 10. CRT DISPLAY MESSAGES

results (SATISFACTORY, UNSATISFACTORY or POOR) and the prognosis after the 3 track scan is complete.

- Avg. Bytes/Sec:

The Status line is used to display the average read and write test bytes per second value of the Performance Function.

- Avg. RPM:

Display consists of the average drive motor speed (in RPM) since the beginning of the Drive Motor Speed Test.

- **Can't Allocate Drive:** AMI...ALIGNMENT was unable to allocate the requested drive. An Error Line message will display showing the reason for the allocation failure.

- **Drive DFn: Allocated:** The selected drive (n) was allocated for use. The Workbench Icon will show 'BUSY'.

- Manual Alignment:

Displayed at beginning of Manual Alignment Function. Same purpose as Auto Alignment Check above.

- Manual Alignment Report:

This message displays in conjunction with the track alignment test results (SATISFACTORY or UNSATISFACTORY) and the prognosis after the TEST button (or keyboard equivalent) has been pressed.

- Manual Mode: Ready

Message indicates that manual mode has been selected, drive motor is on, and heads are ready for movement.

- Manual Mode: Standby

This message indicates that manual mode has been selected, but the motor is not on. NOTE: In Standby mode, the heads will not move.

- Printer Ready:

This message is displayed when the PRINT button (or keyboard equivalent) has been pressed and the printer has been successfully initialized.

- Printer Off Line:

The print feature has been turned off. The printer is now available for use by other tasks.

- Sound Effects On:

The Manual and Auto Alignment Sound effects have been turned on.

- **Sound Effects Off:** Sound effects have been turned OFF.

- Speed Check:

Displayed at beginning of Speed Function. Same purpose as Auto Alignment Check above.

CHAPTER 10. CRT DISPLAY MESSAGES

- Testing Track Alignment:

This message displays during Auto Alignment each time a track is tested.

- Testing Tracks:

This message displays during the track integrity test of the Performance Function.

10.2 Message Line Displays

The Message Line is the center one third of the CRT Display. The most significant messages, condition and test results are printed here. Below is a list of all possible messages.

- BAD TRACK

Possible Performance Function track test result.

- BYTES PER SECOND

The Performance Function report for read and write bytes per second.

- HEADS TRACKING..

This message displays when in manual mode with motor on and the HEADS UP or DOWN arrows (or keyboard equivalent) are pressed, so long as no attempt is made to go outside of legal limits. (Track 00 to 79.)

- POOR

Possible test results from the Auto Alignment Function Condition report.

- RPM

The Speed Function report of real time drive motor speed.

- SATISFACTORY

Possible test results from Auto Alignment Function track test and alignment condition report and Manual Alignment Function track test.

- SELECT DRIVE

This is a system prompt that means the user must select a drive before any function can begin.

- SELECT FUNCTION

This prompt means that a drive has been allocated for use. The next significant step is to select a function.

- TESTING..

Shown after pressing the TEST button in manual drive control mode.

CHAPTER 10. CRT DISPLAY MESSAGES

- UNSATISFACTORY

Possible test results from Auto Alignment Function track test and alignment condition report and Manual Alignment Function track test.

- VALID TRACK

Possible Performance Function track test result.

- WAIT...

This message displays during program startup and during initialization of the printer.

- '....'

This message displays during the Auto Alignment Test track evaluation.

10.3 Error Messages And Corrective Actions

The Error Line of the CRT Display is the bottom one third of the CRT. Drive and system errors are printed in red. A test prognosis, if good, is printed in green. Unless specifically noted, all messages listed below are printed in red in the Error Line.

SYSTEM ERROR

CORRECTIVE ACTION

- Invalid Unit Number

- Select a valid drive
- if drive was connected, check cabling or drive power supply.

- Printer Error

During initialization

- Check preferences setting for printer driver.
- Ensure printer is on and connected.

During printing

- Check printer for error condition such as out-of-paper, etc.

CHAPTER 10. CRT DISPLAY MESSAGES

SYSTEM ERROR

- Function in Progress
- Insert Calibration Disk
- Can't verify Cal disk
- Motor OFF
- Maximum Track
- Minimum Track

CORRECTIVE ACTION

- Terminate function before making selection
- The selected function requires the calibration disk. Insert the original Calibration disk.
- AMI...ALIGNMENT attempted to verify the cal disk but could not, either because the drive was out of alignment or the incorrect disk was inserted. If the original cal disk was inserted in the test drive when this error occurred, the drive probably needs alignment.
- An attempt was made to move the heads in manual mode with the motor off. Turn on the drive motor of the test drive.
- An attempt was made to manually move the heads beyond track 79.
- An attempt was made to move the heads below track 00.

DRIVE ERROR

- Can't Read Disk
- Disk Write Protected
- Incorrect Drv Type

CORRECTIVE ACTION

- Either the disk is corrupt or the drive is out of alignment.
- The Performance Function write test will fail if the disk is write protected. Close the write protect window on the diskette.
- An attempt was made to

CHAPTER 10. CRT DISPLAY MESSAGES

allocate a 5.25" drive.
AMI...ALIGNMENT only works
on the 3.5" floppy drives.

- No Memory
- The system is low on memory and cannot control the drive. Close windows or screens and retry.
- Disk Removed
- The diskette was removed from the test drive during a test. Reinsert disk.

Chapter 11

Keyboard Control of AMI...ALIGNMENT SYSTEM

11.1 Control Sequence Introducer Keys

Programmers may be familiar with the term 'Control Sequence Introducer' (CSI) keys. Generally it means a sequence of control codes sent to something (like a printer) to alert it that a command follows. Users of Hot Key programs will recognize the idea of HOT KEYS that use a qualifying key, (like the AMIGA Key), then a command key to run a program. This is another form of a CSI.

AMI...ALIGNMENT uses both of these concepts to allow for very flexible keyboard control without interfering with your favorite Hot Key program. The Chart below shows each Control Panel Buttons keyboard equivalent.

The CSI key listed below may be any of the following keys:

- Left ALT, Right ALT, Control <CTRL>, Left Amiga <Commodore>, Right Amiga.

With this flexibility, AMI...ALIGNMENT SYSTEM should never interfere with your Hot Key program.

11.2 Keyboard Equivalent Chart

All keyboard equivalent keys may be upper or lower case.

Control Panel Button Keyboard Equivalent Comments

QUIT	CSI Q	
PRINT	CSI P	Toggles printing
SOUND	CSI E	Toggles Sound

CHAPTER 11. KEYBOARD CONTROL

W/B	CSI W	
DRIVES OFF	CSI 9	
DF0:	CSI 0	
DF1:	CSI 1	
DF2:	CSI 2	
DF3:	CSI 3	
FUNCTIONS OFF	CSI F	
ALIGN	CSI A	
SPEED	CSI S	
PERF	CSI L	<L>ongest Test
MAN	CSI M	
MOTOR ON	CSI O	
HEADS UP	Cursor UP Key	(No CSI NEEDED)
HEADS DOWN	Cursor DOWN Key	(No CSI NEEDED)
TEST	T	(No CSI NEEDED)
none	HELP Key	(No CSI NEEDED)

Chapter 12

Multi Tasking With AMI...ALIGNMENT SYSTEM

AMI...ALIGNMENT SYSTEM was designed from the ground up to peacefully multi-task with other programs on your Amiga. However, some things should be considered, and some types of programs should not be run with AMI...ALIGNMENT SYSTEM.

Timing is everything when evaluating a drives alignment condition or performance characteristics. For this reason, AMI...ALIGNMENT SYSTEM operates at a slightly higher system priority than many programs, to ensure the accuracy of the timed tests. Problems may occur when running other programs that have a higher system priority than AMI...ALIGNMENT SYSTEM, or operate in a 'busy wait' mode, using too much of the processors power. If there is a question about whether or not a program is a 'CPU Hog', run the 'Perf' program supplied on the Amiga Extras Disk.

Chapter 13

Printing With AMI...ALIGNMENT SYSTEM

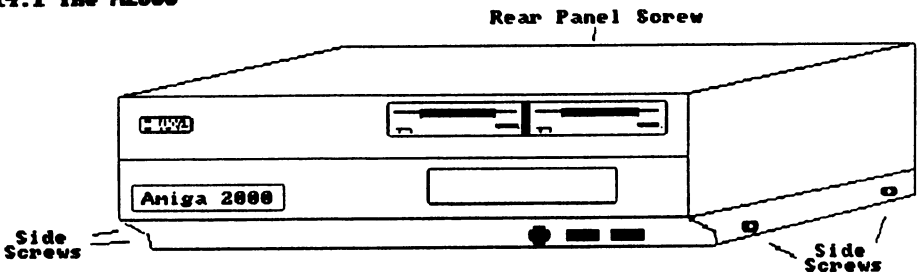
AMI...ALIGNMENT SYSTEM uses the Preferences settings during printing. The AMI...ALIGNMENT SYSTEM Distribution disk includes the Workbench 1.3 printer drivers in the DEVS/PRINTERS directory. If you will be booting from a copy of the distribution disk, you will need to set up Preferences to reflect your printer configuration if you desire printed reports.

When AMI...ALIGNMENT SYSTEM initializes the printer and the PRT: light on the Control Panel comes on (RED), the printer cannot be used by any other task. When the printer feature is turned OFF, the printer is once again available for use by other programs running on your Amiga.

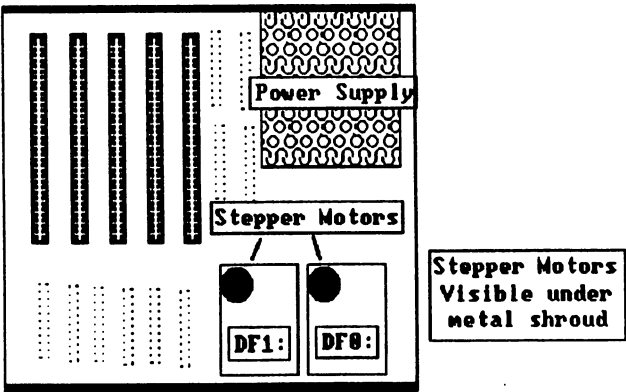
Chapter 14

Drive Disassembly Illustrations

14.1 The A2800



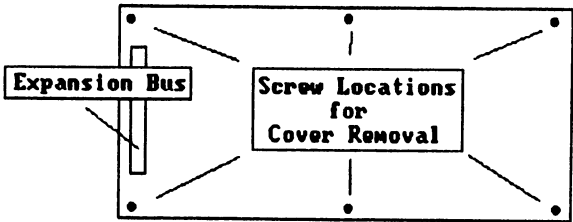
The Aniga 2800
Figure 14.1.1



A2800 Top View with Cover Removed
Figure 14.1.2

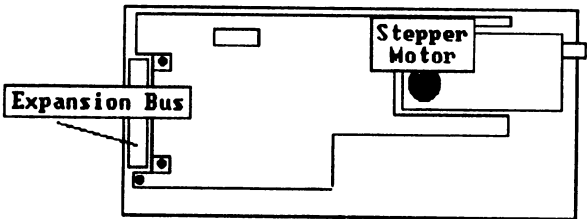
CHAPTER 14. Drive Disassembly Illustrations

14.2 The A500



A500 Bottom View

Figure 14.2.1

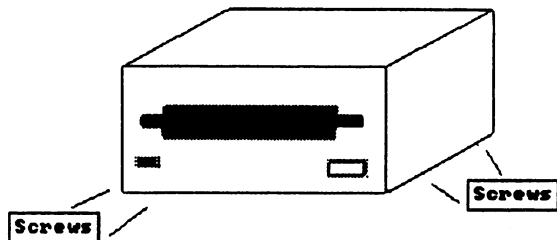


**A500 Top View
Cover Removed**

Figure 14.2.2

CHAPTER 14. DRIVE DISASSEMBLY ILLUSTRATIONS

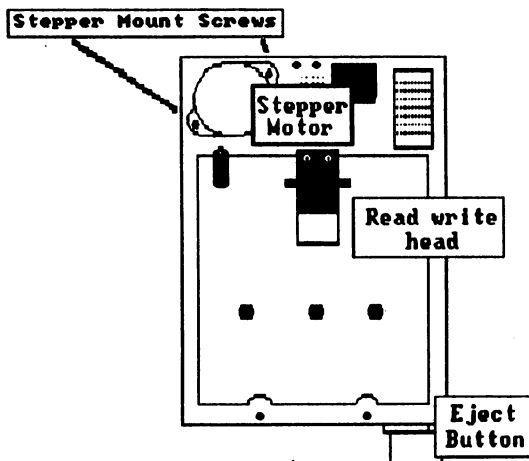
14.3 External Floppy Drives



The A1010 External Drive

Figure 14.3.1

14.4 Direct Gear Drive Stepper Motor

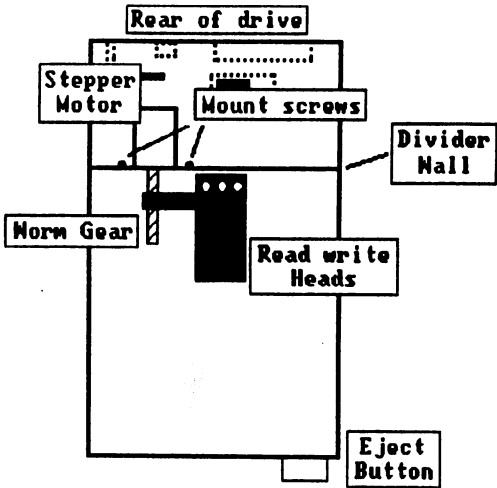


Direct Gear Drive
Stepper Motor
(shroud removed)

Figure 14.4.1

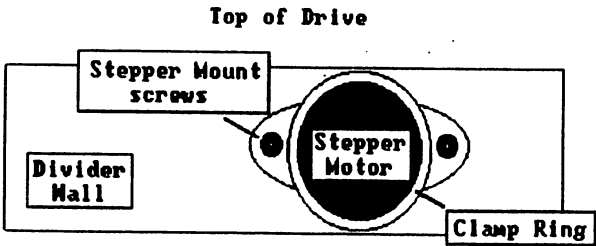
CHAPTER 14. DRIVE DISASSEMBLY ILLUSTRATIONS

14.5 Worm Gear drive Stepper Motor



**M.A.S.T. and AIR
Drive (Top View)**

Figure 14.5.1



**M.A.S.T. and AIR Drive
Rear View of divider wall**

Figure 14.5.2

CHAPTER 15

The UnStick Utility

During development of AMI...ALIGNMENT SYSTEM, one problem seemed to recur with all types of floppy drives tested. Intermittently, the read write heads seem to stick at track 0. The cause of this problem is unknown, but the circumstances that lead up to the problem, and the cure, are known. The problem begins when a floppy drive goes into an error condition. The drive seeks track 0, then re-attempts the operation that caused the error. If the error does not clear, the heads are left at track 0. So far no problem. BUT, if the computer is booted while the heads are still at track 0, sometimes the heads get 'stuck' there. Have you ever booted your Amiga, only to have the drive reject a perfectly good startup disk? Chances are the heads were stuck at track 0. For drive DF0:, the only cure is to reboot the machine. Sometimes the machine must be booted several times before the drive gets 'unstuck' and can accept a valid diskette. Enter UnStick!

The UnStick utility comes in two variations, a simple no-frills Workbench version and a more powerful CLI version that incorporates error reporting.

Both versions of the UnStick utility use some software magic to force the read write heads off of track 0.

The Workbench versions of UnStick are called 'UnStick_DF0' thru 'UnStick_DF3'. To run, simply double click on the 'UnStick_DFn' icon for a valid drive. An AmigaDOS formatted diskette must be in the drive when UnStick is run. If any type of error occurs the screen will 'beep', that is the screen will flash the complemented colors of the Workbench Screen (usually yellow).

To find out why UnStick failed, (the screen flashed), run the CLI version of UnStick.

The CLI version of Unstick takes the drives unit number as a command line argument. To run UnStick on DF2:, from the CLI type:

```
UnStick 2 <RETURN>
```

If UnStick fails, a reason for the failure will be displayed.

CHAPTER 16

Problems With ROM System Software

Are you experiencing the 'flaky floppy' syndrome, but only intermittently? Or, have ALL of your floppy drives suddenly developed a case of the 'flakes'?

The Amiga boasts a very powerful operating system, but its very power and complexity makes it prone to some strange behavior. An incorrectly designed or connected peripheral, or a peripheral connected but not turned on may cause considerable confusion on the part of the operating system. This confusion may manifest itself as unexpected system crashes (Gurus) or intermittent misbehavior of one or more of your floppy drives. If you have been experiencing any of the above symptoms, AMI...ALIGNMENT can help you pinpoint and correct the problem prior to disassembly and realigning all of your hardware. Try the following procedure ...

- Return your system configuration to a 'standard' Amiga. That is, disconnect any external floppy or hard drives.
- Boot your system using the AMI...ALIGNMENT SYSTEM distribution disk. Perform all of the tests on DF0: (and DF1: for the A2000) to insure that the internal floppy drive(s) are OK.
- Assuming everything is satisfactory up to this point, turn off your system and connect any external floppy drive(s). If the external floppies have a power switch, leave the drives turned off. Reboot with the distribution disk and retest the internal drives. If test results are different than the original test conducted, (especially the PERFORMANCE FUNCTION Average Read and Write test results), the external floppies are causing your 'flaky floppy' problems!
- Repeat the above procedure, but turn on the external floppy(s) and test them as well as the internal drive(s). Any deviation in test results from the original test indicates a problem in the external drive(s).
- Again, repeat the above procedure, this time connecting your hard drive. If it has a power switch, leave it OFF. Reboot and retest all of your system floppies. Any deviation from the original test results on the internal and external floppies indicates a problem with the hard drive.

Using this technique (of performing all tests on your floppies with no external devices connected to establish a 'standard', then connecting peripherals one at a time and retesting) you can test every piece of hardware in your system, thus isolating the cause of a 'confused' operating system.

